Abstract of the disclosure

A substrate on which an amorphous silicon film is formed is placed in a vacuum chamber. An organic nickel vapor or gas is introduced into the chamber and then decomposed, so that a thin film containing nickel (a catalytic element which promotes crystallization of the amorphous silicon film) or a compound thereof is uniformly deposited on the amorphous silicon film. After that, the substrate is heated at a temperature such as 550 °C lower than a normal solid phase growth temperature for a short time such as 4 hours, to uniformly crystallize the amorphous silicon film. A crystalline silicon film is obtained by this crystallization process.